

Negawatts and Killerwatts

“Growth” does not have to mean extracting more fossil fuels to promote increased wealth and inequality. It may yet be that growth in understanding brings about the phasing out of fossil fuels, though this may be a big ask in relation to the 73 million Americans who elected the drill baby president. What possible objections can there be though to cheap energy prices as the means of replacing fossil fuels with energy saving technologies such as heat pumps or E transport? It goes without saying that the latter is greatly preferable to the former, but it still does not address the fundamental problem of value. I do not believe that cheap energy prices alone, however well-intentioned can bring us back from overshoot.

In principle there is a fundamental relationship between price and consumption. If price goes down, consumption often goes up. So, a pricing policy designed to encourage the take up of lower energy technology needs to be proof against people simply using ever more energy. A key issue I address in this essay is the constant proliferation of gadgets which previous generations managed without. Some demand for electricity can be classified as both essential and inelastic. Domestic base loads such as running refrigerators change little if at all in response to energy pricing. Domestic heating is an example of semi-elasticity. Unless extremely poor, consumers are unlikely not to heat their homes at all. Thermostats may be turned down in response to higher prices, but unless there is a sophisticated and politically practical regressive charging system, the least wealthy will suffer whilst the wealthy continue to overheat their homes (or overcool during a heat wave).

Negawatts and Killerwatts at the very least offer us a way of rethinking this position. I shall explain the concept of the killerwatt shortly, for it is an invention of my own. Let us first deal with negawatts. The negawatt has been around for quite a long time, since 1985 in fact. It was the brainchild of Amory Lovins of the Rocky Mountain Institute. Lovins (b1947) is a physicist known for his work on energy efficiency. The negawatt was (and still is) a way of conceptualising energy not used, thereby promoting energy efficiency and thus reducing fossil fuel consumption. LED light bulbs, now widely adopted despite a tabloid newspaper’s once fatuous campaign against them, are estimated to have the global potential of 1,402 TWh of annual savings. Such savings can be counted as negawatts, though I remain to be convinced that this not just a play on words.

Negawatts have been most successful in demand management. A perennial problem with electricity generation, distribution and consumption has been the difficulty of absorbing or storing excess generation capacity during periods of low demand and at other times meeting peak demand. Nuclear power is particularly difficult to start up and shut down, so tends to be used for continuous base loads. As right-wing politicians constantly remind us, the output from renewables goes down when the wind doesn’t blow or the sun doesn’t shine, which makes it hard to dispense with power plants that can be started and shut down relatively quickly. Unfortunately, these are often fossil fuel driven. The ability to store electricity has improved significantly since 1985, initially through pumped water storage schemes though more recently through compressed air storage, heat storage in sand and the rapidly developing technology of large-scale batteries that do not rely on lithium. It is claimed that that any such technologies which reduce strain on the grid or the switching in of peak only power plants are negawatt savings.

Negawatts are thus used conceptually in accounting schemes that aim to smooth out peaks and troughs in grid demand. An example would be incentivising consumers to charge electric vehicles

or run high energy appliances overnight. Negawatts are very rarely, however used in consumer education. To develop the electric kettle work (see *Munchlines and Monsters*), for example, negawatts could be used to quantify the energy saved by not overfilling, but they are not used in that way. Whether they might ever be seems perhaps unlikely since at the level of the individual, quantification of a non-quantity may not be an entirely coherent aspiration. Moreover, the present generation of so-called “smart meters” has, in my view, contributed very little to the problem of discounting the free riding of nature upon which the fossil fuel/renewables mix depends. Marginal savings resulting from watching a smart meter might technically be counted as negawatts, but the concept of negawatt perhaps for good reasons has not been promoted by utility companies and is unfamiliar to most people.

Changing public attitudes to the way in which energy is priced to include recognition of free-riding nature and discounting the needs of future generations requires a different approach. Hence my invention of the killerwatt. Rather than attempting to quantify energy not used, the killerwatt quantifies “munch line” energy instead of fossil fuel energy.

The introductory example I am giving here concerns mowing an average sized lawn. When I was a young boy, one of my domestic chores was to mow the lawn and for this purpose, our family owned a Qualcast push mower similar to the one in the picture. Let us say that I worked hard, the job took me one hour and that I was averaging over that hour 75 watts (there would have been periods of slack and the occasional peak shoves at over 100 watts). I would have earned no less than 27 10kJ notes, which sounds a lot. Unfortunately, at monster energy rates, that’s a payment of just under two pence (1.96p to be precise, which is 1.96p more than I got, though they did house, clothe, feed me and pay the school fees). However, at munch line energy rate, I’d managed 0.075 of a killerwatt, which at current minimum wage rates works out at £5.21, which seems a pretty reasonable rate for the job!



So, using monster energy rates we’d pay our boy 26p for a full day’s hard work or (according to AI) £1.96 for a 100-hour week! (boys would have worked that in Victorian times, but now any employer expecting that would rightly be locked up). Of course, if I’d been born 63 years later, my parents would have had a gadget, perhaps a corded electric mower rated at 1.4 kW. Let’s say in doing the same job I had the mower on for 15 minutes. I’d have used 0.35 of a kWh, which would have registered as a mere 6.5p on the smart meter. But the mower would have used 1,125,000 Joules. That’s 112.5 10kJ notes, or 85.5 more than if I’d done it with the old push mower. This is one way of showing the extent we are free-riding nature. The munch line rate for 1,125,000 Joules is £19.01 (minimum wage) as against the monster energy rate of 6.5p. Despite the labour-saving ease it affords us, monster energy doesn’t seem to be very efficient. Clearly, we’d owe

nature a great deal less whilst both planet and future generations would be a great deal better off if we weren't so indifferent to technology such as push mowers. Our children might also be stronger and possess healthier BMIs too. (That's another saving against future NHS costs).

But is this really going to happen? Checking it out, I see that new hand push mowers can still be bought. What are the chances of their widespread adoption and a shift towards other pre-gadget technologies (such as a pair shoes a kid could wear walking to school instead of being driven in an SUV)? Here's another example that merits thought.

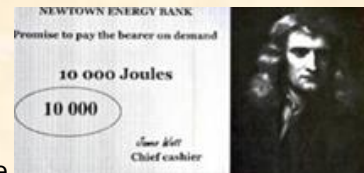


Tumble driers rank fairly near the top of the monster energy consumer list of domestic appliances. The one on the right is rated at a colossal 4.18 kw. A typical drying programme that can be set runs for 125 minutes. That will use 8.71kWh which is hardly cheap even at monster energy rate. It comes out at £2.27. Is this an avoidable cost? What exactly is wrong with letting the sun and the wind do the job? The bill you will receive will be £0.00. Your contribution to climate change will have been zero.

If £2.27 is a trifle pricy in monster energy, in munch line energy it comes to over 31 million Joules, (31, 356, 000 to be precise.) That comes to:



313 of these plus another six of these



Given that we previously worked out the munch line value of a 10kJ note as £3.86, it's going to cost well over £1210 to pay a man to dry the clothes by pedalling a big fan.

Most unfortunately, "smart" meters don't in practice tell you things such as what portion of your daily usage has gone to the tumble drier, though you could work it out for yourself with a spreadsheet. Surely a "smart" meter would produce for you a breakdown of what your kettle has used, what the fan heater in the bedroom has used, what the light you had on for three hours has used ...and what your tumble drier has used. *That* would be "smart". So, where is all this taking us? Am I advocating that we return to a world where everything is done the old pre-industrial way by human labour and draft animals? Of course not! That is never going to happen, nor need it. A genuinely "smart" meter that audits all the electrically powered devices in use and suggests economies that might be made to mitigate planet heating would be a big step forwards and might one day even happen.

Meanwhile, A much more fundamental problem has landed us in our predicament. It is the lifestyle that monster energy consumption has made possible.



What we are seeing in the picture is a runaway chicken and egg situation that is propelling us towards inevitable climate tipping points. We can perhaps trace at least some of the origins of this to inventions such as the vacuum cleaner and the washing machine. Though perhaps conceived of as “labour saving devices”, they have not saved labour. They have changed the nature of labour and unwittingly ushered in an era of more, not less labour for a great many individuals. Other individuals, of course, may find themselves with nothing to do, excluded from paid work by the monster energy consumption that has made too much work for others possible.

Seen in this way, we can begin to see that our catastrophic undervaluing of energy is a consequence of undervaluing other things.

- Time to accomplish tasks through physical labour and benefit from it.
- Time to be creative – to paint pictures, make models, write poetry, sing or act.
- Time to spend with others and develop relationships.
- Time to read and educate the self (the antithesis of keyboard warrior kneejerks)
- Time to help others in need
- Time to spend with children
- Time to spend in nature
- Time to just “be”.

Time would seem to figure a lot here and we don’t have much of it left as we career towards the tipping points that are the inevitable consequence of plundering in just three hundred years what nature took 300,000,000 years to lay down.

How do educators introduce such ideas to new generations? We could do worse than think how we could introduce killerwatts into their lives. We know that climate anxiety is a serious, growing problem with youth. We know that positive action to do something mitigates anxiety. We won’t know whether pushing a lawnmower (with understanding as an example of positive action) in preference to the doomscrolling that generates anxiety until we’ve tried.